Restoring Rain use Efficiency to an Incised Upland Valley System in Namibia Using Filters and Ecosystem Management Understanding (EMU) Principles

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Key words : Base levels , BIOTA , EMU , gully erosion , restoration

Introduction Proactive management to avoid degradation is a worthy ideal for rangelands . However , managing the legacy of historic degradation is equally important and therefore requires an assessment of resource allocation between avoiding new degradation and repairing problems from the past . Quite clearly , avoiding future degradation should be a priority , but the benefits of repairing key productive landscapes should not be overlooked . Using principles within the Ecosystem Management Understanding (EMU) Process , and with the local farmers encouragement , we developed a trial restoration project of an upland fertile valley system in the Auas-Oanob Conservancy . The EMU approach emphasises catchment ecology and the identification of geomorphic base levels that determine patterns of soil moisture balance (Tinley 1982) and hence productivity , diversity and general ecological health . This approach is in stark contrast to the symptoms-band-aid" approach that appears to predominate . Our approach veiws rangelands as ecosystems controlled principally by base levels , which when incised , initiate cascading headward gully erosion and landscape leaking (Pringle *et al* . 2006) . This project falls under the Biodiversity Transect Analysis in Africa (BIOTA) program .

Materials and methods The site is on Farm Lichtenstein-sud (21 .01°S , 17 .89°E) on sandy loam in the Highland Savanna of Namibia , with a mean annual rainfall of roughly 300mm . A gully system , with a slope of about 1 :70 , was treated with filters made of branches cut selectively from *Acacia mellifera* that was growing in dense stands nearby . The branches were packed at strategic locations to slow down flowing water and trap some sediment , while allowing excess water to pass through . At some locations the branches were woven with wire and tied to nearby trees . If there was no appropriate tree nearby , a steel post was hammered in to tie the wire to . Ten of the treated features are compared with ten similar features in other unfiltered gully systems . The sampled features were measured , by landscape function analysis (LFA) , with transects running across rills or gullies . The measured features consist of four gully confluences and six rills per gully system . Half of the measured features were fenced to exclude cattle , both at the treated gully system and the unfiltered systems . The restoration work along roughly 2km of rills and gullies took about 100 person days to complete and used up 30 steel posts of 0 .9m length and about 900m of fencing wire .

Results The filters are waiting for rain , therefore no follow-up results are available yet to compare with the baseline .

Figure 1 *Branches of* A . mellifera *packed in a gully head to form a filter .*

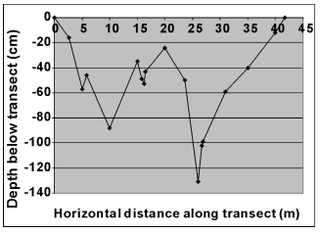

Figure 2 *e .g . of cross section base-line above confluence of two gullies .*

Figure 3 *Water becomes violent at a confluence , needing strong filters .*

Conclusions It is too early to determine effectiveness of the filters . If the current rainy season is poor , then the filters may rot before they function in a subsequent rainy season . Such restoration work is not only risky , but costly . It must form part of a broader strategy , coordinated with neighbouring farmers , aimed at catchment level management to restore hydrological functioning that can then allow improved grazing management to become effective . While the location and management of infrastructure , and ecologically-based grazing management are also critical in maintaining remaining ecological and resource integrity , to accept historic degradation as an intractable reality is demoralising . We (and farmers) also recognise values other than gross margins in allocating resources and assessing performance .

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